What is Claimed Is:

1. A system for non-invasively diagnosing abnormal respiratory function, comprising:

a patient breathing tube;

a flow meter connected to said tube; and

a spectrometer interconnected to and in fluid communication with said tube, wherein said spectrometer is adapted to detect the concentration of gases present in said tube.

2. The system of claim 1, further comprising data processing means interconnected to said flow meter and said spectrometer.

3. The system of claim 2, wherein said second data processing means is programmed to calculate and display the concentration of said gases detected in said air.

4. The system of claim 2, wherein said second data processing means is programmed to calculate and display the concentration of CO_2 relative to the concentration of O_2.

5. The system of claim 2, wherein said second data processing means is programmed to calculate and display the concentration of NO relative to the concentration of CO.

6. The system of claim 2, wherein said second data processing means is programmed to calculate and display the ratio of CO_2 to O_2 relative to the ratio of NO to CO.

7. The system of claim 2, wherein said second data processing means is programmed to calculate and display the ratio of NO to CO relative to expired volume.

8. The system of claim 2, wherein said second data processing means is programmed to calculate and display the ratio of CO_2 to O_2 relative to NO.

9. The system of claim 2, wherein said second data processing means is programmed to calculate and display the ratio of CO_2 to O_2 relative to expired volume.

10. The system of claim 2, wherein said second data processing means is programmed to calculate and display the ratio of CO_2 to O_2 simultaneously with a plot of NO relative to expired volume.

11. The system of claim 2, wherein said microprocessor is programmed to phase align the concentrations of said gases to allow for accurate plotting of ratios and concentrations as a function of expired volume.

12. A system for non-invasively diagnosing abnormal respiratory function, comprising:

a patient breathing tube having a port formed therein;

a flow meter connected to said tube;

a laser diode spectrometer remotely interconnected to and in fluid communication with said tube via said port.

13. The system of claim 12, further comprising a vacuum pump interconnected to said spectrometer and said port.

14. The system of claim 13, wherein said vacuum pump operates at a rate of between about 10 to 100 milliliters per minute.

15. The system of claim 12, wherein said laser diode spectrometer is adapted to measure analyte concentrations of NO, CO, CO_2, and O_2.

16. The system of claim 12, wherein said laser diode spectrometer simultaneously measures CO_2, O_2, NO and CO.

17. The system of claim 12, wherein said laser spectrometer alternates between the measurement of any combination of CO_2, O_2, NO, and CO at a rate of at least twenty times per second for each such molecule.

18. The system of claim 12, wherein said laser spectrometer comprises a monochromatic light source from at least one tunable diode laser operating in a ring-down cavity mode with two or more mirror to increase apparent path length.

19. The system of claim 12, wherein said tube further includes a coupling for attachment to standard ventilator circuits.

20. The system of claim 12, wherein said tube further includes a coupling for attachment to a patient mouthpiece.

21. The system of claim 12, wherein said flow meter is a sensor selected from the group consisting of thermal flow sensors, pressure differential sensors, and ultrasonic flow sensors.

22. A method of identifying the source of abnormal pulmonary function, comprising the steps of:

expiring air containing at least two gases into a breathing tube;

measuring the volume of air expired into said breathing tube;

simultaneously measuring the concentrations of said at least two gases; and

displaying said concentrations on a display screen.

23. The method of claim 22, wherein the step of displaying said concentrations on a display screen comprises plotting a graph of the concentration of CO_2 relative to the concentration of O_2.

24. The method of claim 22, wherein the step of displaying said concentrations on a display screen comprises plotting a graph of the concentration of NO relative to the concentration of CO.

25. The method of claim 22, wherein the step of displaying said concentrations on a display screen comprises plotting a graph of the ratio of CO_2 to O_2 relative to the ratio of NO to CO.

26. The method of claim 22, wherein the step of displaying said concentrations on a display screen comprises plotting a graph of the ratio of NO to CO relative to expired volume.

27. The method of claim 22, wherein the step of displaying said concentrations on a display screen comprises plotting a graph of the ratio of CO_2 to O_2 relative to NO.

28. The method of claim 22, wherein the step of displaying said concentrations on a display screen comprises plotting a graph of the ratio of CO_2 to O_2 relative to expired volume.

29. The method of claim 22, wherein the step of displaying said concentrations on a display screen comprises plotting a graph of the ratio of CO_2 to O_2 simultaneously with a graph of NO relative to expired volume.

30. The method of claim 28, further comprising the step of determining the presence of hypoventilation with inflammation of the airways when said ratio of CO_2 to O_2 is high and said concentration of NO is high.

31. The method of claim 28, further comprising the step of determining an infection when said ratio of CO_2 to O_2 is low and said concentration of NO is high.

32. The method of claim 22, further comprising the step of evaluating the effectiveness of treatment of a pulmonary disease based on the changes in concentration of said gases over the course of said treatment.

33. A method of distinguishing between at least two sources of abnormal pulmonary function in a patient, comprising the steps of:

having said patient expire air containing at least two gases into a breathing tube;

measuring the volume of air expired into said breathing tube;

concurrently measuring the concentrations of said at least two gases; and

displaying said concentrations on a display screen, wherein said display screen further includes a graph of the expected concentrations of said gases corresponding to said sources of abnormal pulmonary function.

34. The method of claim 33, wherein the step of displaying said concentrations on a display screen comprises plotting the concentration of CO_2 verses O_2.

35. The method of claim 34, wherein said graph of said expected concentrations includes sections corresponding to hypoventilation, pulmonary embolism, and alveolar consolidation.

36. The method of claim 35, wherein said section corresponding to hypoventilation comprises an area on said graph representing high CO_2 concentration verses low O_2 concentration, said section corresponding to pulmonary embolism comprises an area on said graph representing low CO_2 concentration verses high O_2 concentration, and said section corresponding to alveolar consolidation comprises an area on said graph representing low CO_2 concentration verses low O_2 concentration.

37. The method of claim 33, wherein the step of displaying said concentrations on a display screen comprises plotting the ratio of CO_2 to O_2 verses the ratio of NO to CO.

38. The method of claim 37, wherein said graph of said expected concentrations includes sections corresponding to normal function, emphysema and congestive heart failure, pulmonary vascular occlusion, and infection.

39. The method of claim 38, wherein said section corresponding to normal function comprises an area on said graph representing a high CO_2 to O_2 ratio and a low NO to CO ratio, said section corresponding to emphysema comprises an area on said graph representing a high CO_2 to O_2 ratio and a high NO to CO ratio, said section corresponding to pulmonary vascular occlusion comprises an area on said graph representing a low CO_2 to O_2 ratio and a low NO to CO ratio, and said section corresponding to infection comprises an area on said graph representing a low CO_2 to O_2 ratio and a high NO to CO ratio.

40. The method of claim 33, wherein the step of displaying said concentrations on a display screen comprises plotting the concentration of NO verses the concentration of CO.

41. The method of claim 40, wherein said graph of said expected concentrations includes sections corresponding to asthma, COPD and infection, normal function, and pulmonary disorders including pulmonary hypertension, pulmonary ischemia, pulmonary occlusion, and cystic fibrosis.

42. The method of claim 41, wherein said section corresponding to asthma comprises an area on said graph representing high NO concentration verses low CO concentration, said section corresponding to COPD and infection comprises an area on said graph representing high NO concentration verses high CO concentration, said section corresponding to normal function comprises an area on said graph representing low NO concentration verses low CO concentration, and said section corresponding to said pulmonary disorders including pulmonary

hypertension, pulmonary ischemia, pulmonary occlusion, and cystic fibrosis comprises an area on said graph representing low NO concentration verses high CO concentration.

43. The method of claim 33, wherein the step of displaying said concentrations on a display screen comprises plotting the ratio of CO_2 to O_2 verses the concentration of O_3.

44. The method of claim 43, wherein said graph of said expected concentrations includes sections corresponding to COPD, asthma, pulmonary vascular occlusion, and infection.

45. The method of claim 44, wherein said section corresponding to COPD comprises an area on said graph representing a high CO_2 to O_2 ratio and a low O_3 concentration, said section corresponding to asthma comprises an area on said graph representing a high CO_2 to O_2 ratio and a high O_3 concentration, said section corresponding to pulmonary vascular occlusion comprises an area on said graph representing a low CO_2 to O_2 ratio and a low O_3 concentration, and said section corresponding to infection comprises an area on said graph representing a low CO_2 to O_2 ratio and a high NO to O_3 concentration.